TEPP Radiation Specialist Course

Louisville Fire Department Fire Training Center

Louisville, KY, March 4-8, 2013

J. Curt Pendergrass, PhD

Supervisor, Radioactive Materials Section

Kentucky Radiation Health Branch

Kentucky DEPT. FOR PUBLIC HEALTH RADIATION HEALTH

LOUISVILLE FIRE DEPT. 1858

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RS Course Instructors & Support Staff

- Tom Clawson
- Mark Linsley
- Ken Keaton
- Celeste Cusack
- Major Ed Dunagan, Chief Training Officer, Louisville Fire Department
- Kentucky Radiation Health Branch Staff

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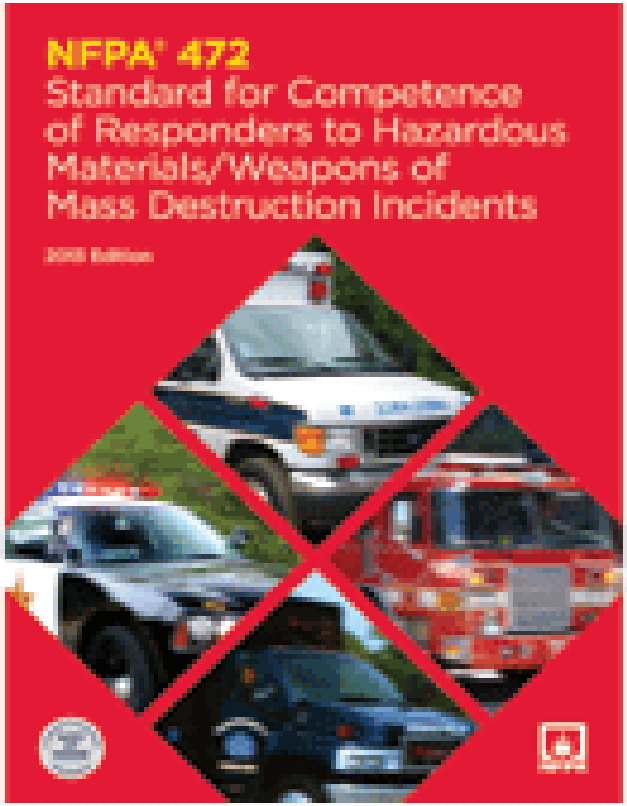
NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, 2013 Edition, Chapter 18: Competencies for the Technician with a Radioactive Material Specialty.



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Terminal Performance Objectives

- The goal of NFPA 472 Chapter 18 is to provide the Radiation Specialist with the knowledge and skills to perform the following tasks safely:
  - Analyze a hazardous materials incident involving radioactive materials to determine the complexity of the problem and potential outcomes.
  - Plan a response for an emergency involving radioactive material within the capabilities and competencies of available personnel, personal protective equipment, and control equipment based on an analysis of the radioactive material incident.
  - Implement the planned response to a hazardous materials incident involving radioactive material.

The Target Audience

- Important to invite a diverse and widespread group of first responders from various agencies throughout the state and throughout the US.
- Objective is not to train every Hazmat Technician in one agency but to train a couple of qualified individuals in as many agencies as possible.
- Students are encouraged to bring their own survey meters and radioisotope identification devices.
- This is an advanced level training course and students will be expected to be proficient in basic algebra.

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Kentucky Fire Departments Represented

- Louisville Fire Department
- Lexington Fire Department
- Ft. Knox Fire Department
- Radcliff Fire Department
- Paducah Fire Department
- Owensboro Fire Department
- Anchorage Fire Department
- Reidland-Farly Fire Department
- Elizabethtown Fire Department

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Other Kentucky Agencies Represented

- Louisville Metro Police Department/ Joint Emergency Services Unit
- Louisville Metro Department of Public Health
- Louisville Jefferson County Emergency Management
- Kentucky State Police Commercial Vehicle Enforcement Division
- 41st WMD Civilian Support Team
- Kentucky Army National Guard
- FBI Hazardous Materials Response Unit
- Kentucky Radiation Health Branch, Dept. for Public Health

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Out of State Organizations Represented

(10+ Slots Offered – 6 Filled)

- Ashville North Carolina Fire Department (2)
- Idaho Regional Response Team 3 (1)
- Caldwell Idaho Fire Department (1)
- South Carolina Department of Health & Environmental Control (2)

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Selection of the Proper Venue

- Adequate facilities and space for training
  - Classroom capable of holding 25-30 students
  - Equipment supply room
  - Adjoining or additional classroom space for break out sessions
  - Outdoor facilities with ample room for exercises with live sources located at the training site
- Ability to control sources and control radiation exposure during all hands-on activities (indoor and outdoor)
- Secure facility where access to training grounds can be restricted during the use of radioactive sources

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Louisville Fire Training Academy (LFTA)

- Abundant classroom space for 30 students and ample parking.
- Large adjoining storage room and classroom for equipment and supply storage.
- Large outdoor training area with fire tower and space for vehicle accident scenarios.
- Entire outdoor training area is secured with a surrounding chain link fence and access controlled.
- Located just a few miles south of downtown, convenient to hotels, interstates and food.

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Added Bonus of Location

- Louisville is home to numerous radioactive materials licensees
  - LFTA located just less than a mile from Cardinal Health Louisville Radiopharmacy and Cyclotron
  - Five industrial radiography licensees within a 10 mile radius of LFTA

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Kirk & Blum
Manufacturing
S 15th St
W Hill St
W Hill St
Sud-Chemie
AG
Healing
Place

Monday Agenda

- Introductions
- Course Overview
- Pretest and Review of Pretest
- Module 1: The Atom and Radioactivity
- Module 2: Characteristics of Radioactive Decay
- Module 3: The Chart of the Nuclides
- Module 4: Radiation Interactions
- Module 5: Dosimetry Terminology

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Tuesday Agenda

- Assignment Review
- Module 6: Biological Effects
- Module 7: Radiation Detector Theory Part 1
- Module 8: Radiation Detector Theory Part 2
- **PET Facility Tour - 1:00 pm**
- Module 9: External Exposure Control

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Tour of Cardinal Health Cyclotron and Radiopharmacy

Tuesday, March 5, 2013

at 1:00-2:00 pm

Joseph Bickett RPh, JD, LLM

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Cardinal Health Louisville Nuclear Pharmacy Services

- **Cyclotron**
  - Production of PET radionuclides
  - Deliver to most of KY, southern IN and far south as Nashville, TN
- **Radiopharmacy**
  - Preparation and distribution of radiopharmaceuticals throughout central KY and southern IN
- **State of the art calibration facility**
  - Staffed by registered nuclear pharmacist, Ludlum trained

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Before We Left for the Cardinal Tour

- A little presentation to:
  - Tell them how to get there
  - Show them what it looks like
  - Tell them what they are going to see
  - Tell them how it is used

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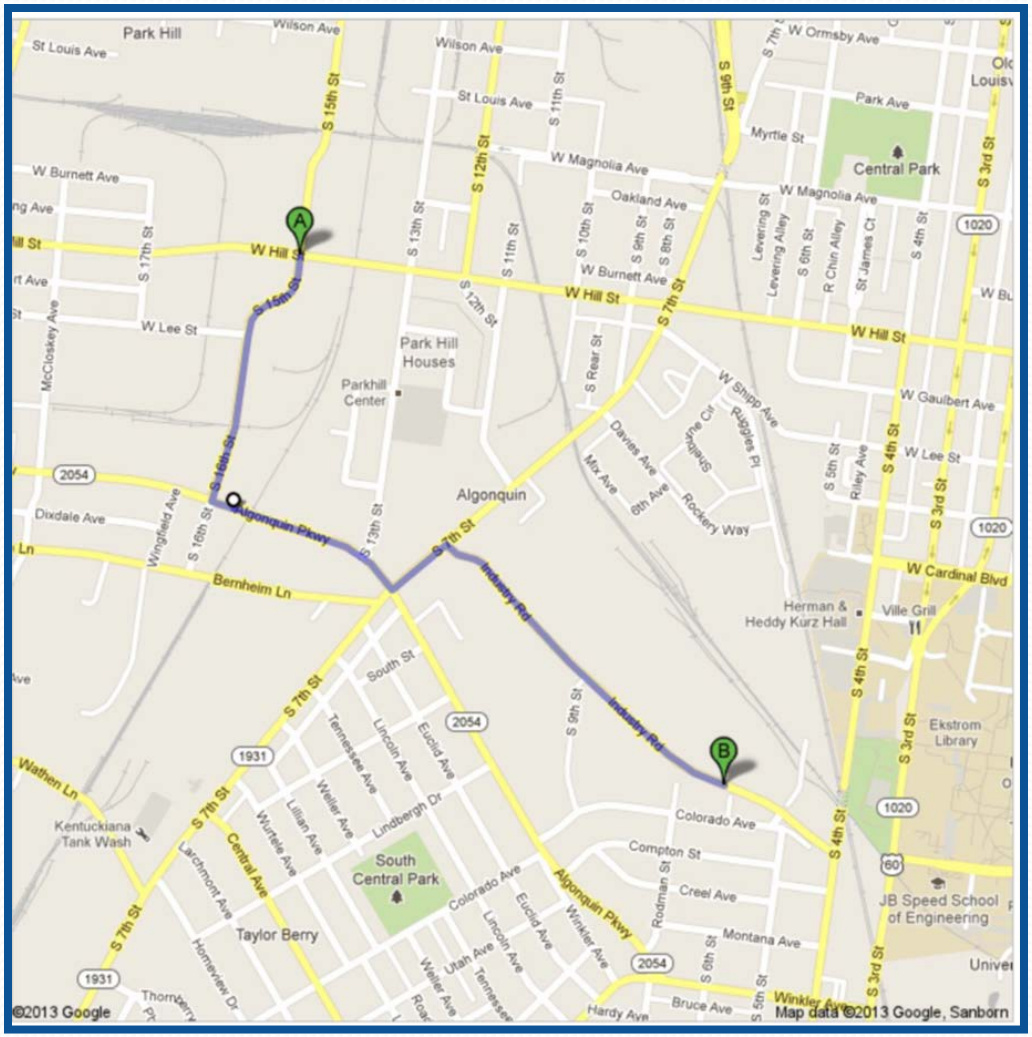
Nuclear Pharmacy Services Location 70
411 Industry Road
Ste. 500-A
Louisville, KY 40208

Tell Them How To Get There



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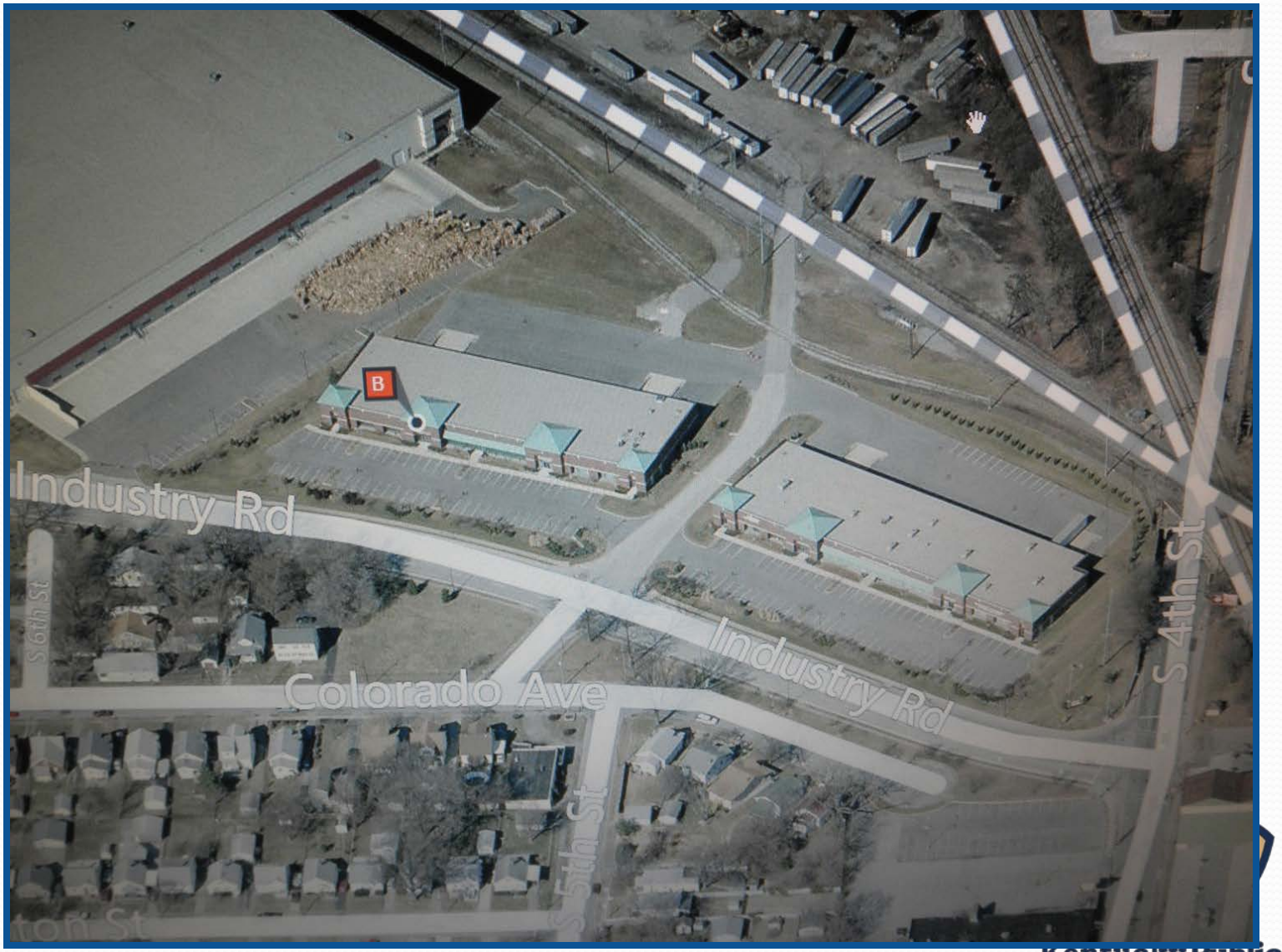
Show Them What It Looks Like



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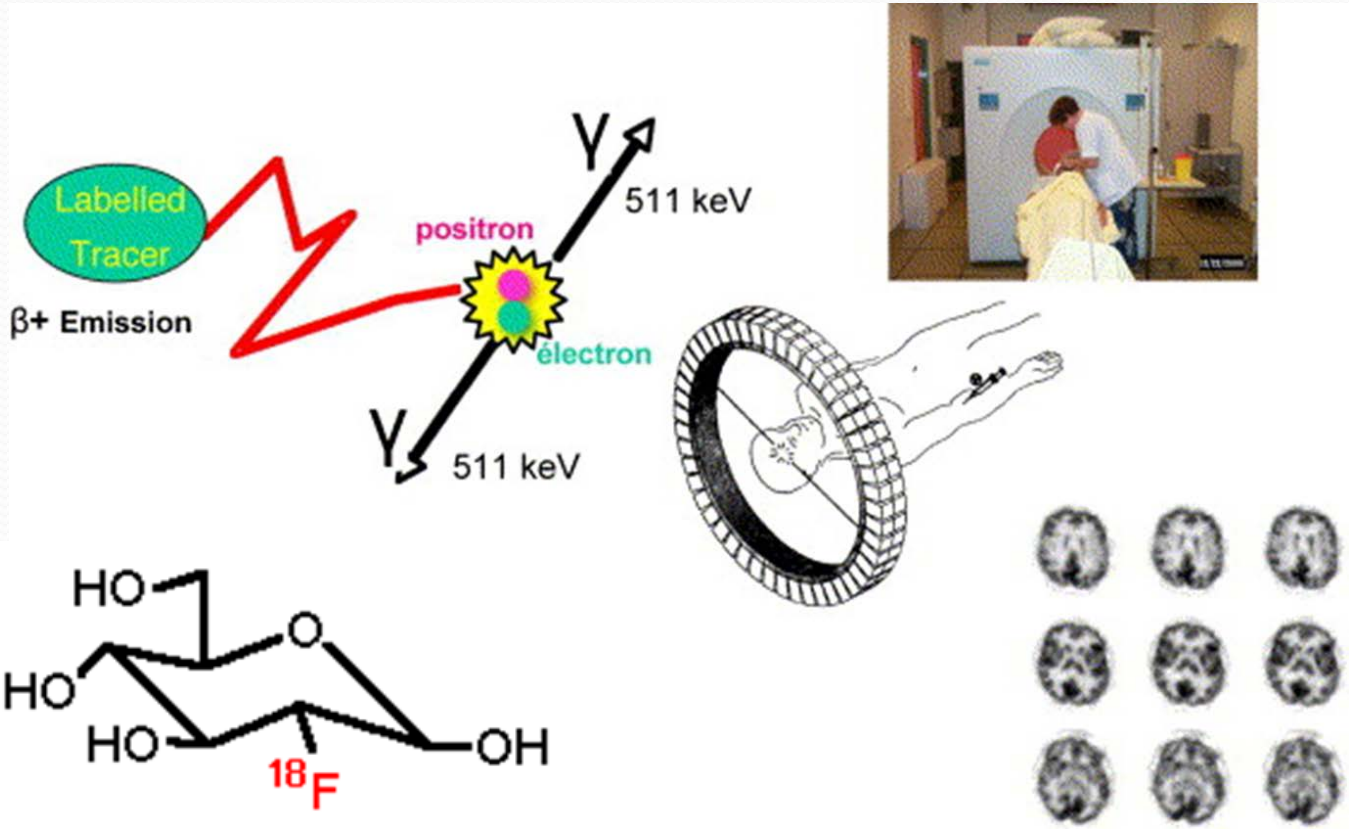
Tell Them What They Are Going To See and How It Is Used (A PET Primer)



^{18}F-Fluorodeoxyglucose

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Cardinal Health Photos Used With Permission

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Actual Photos From Tour

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Wednesday Agenda

- Assignment Review
- Module 10: Uses and Regulations
- Module 11: Transportation
- **Speaker: Industrial Radiography Operator**
- Module 12: Radiological Survey Instruments
- Practical Exercise Rotations (30 minutes each):
  - Radiopharmaceuticals instrument comparisons
  - Instrument Energy Response
  - Shielding Example Using Cesium
  - Inverse Square Law Example

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Demonstration by Industrial Radiography Company

Wednesday, March 6th, 10:30-11:30 am

Hayes Testing Laboratory, Inc.

Louisville, KY

Dan Hayes, Sr., President, RSO

Dan Hayes, Jr., General Manager

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Radiography Vehicle with Mobile Darkroom

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Industrial Radiography Demonstration

QSA Sentinel 880 Delta with 15.4 Ci of Ir-192

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Wednesday Afternoon Hands-On

- Practical Exercise Rotations (30 minutes each):
  - Radiopharmaceuticals instrument comparisons
  - Instrument Energy Response
  - Shielding Example Using Cesium
  - Inverse Square Law Example

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Radiopharmaceuticals for Training

- F-18, 10 mCi dose. Packaged and labeled (Yellow II, TI = 0.8) early in the morning. By the time of exercise, dose had gone through about 2 half-lives so dose rates did not match shipping labels.
- Tc-99m (30 mCi doses), Tl-201 (5 mCi dose), I-123 (5 mCi dose) to be used for energy response comparison with different survey meters.
- I-131, 10 mCi in 3 separate doses in three different thickness shields in separate packages. Labels and TI different for each even though the activity level same. Student were to recognize discrepancy and try to figure out why, or at least gain understanding shielding as effectiveness as it applies to labeling.

Radiopharmaceuticals Instrument Comparisons

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Gamma Energy Response Comparison

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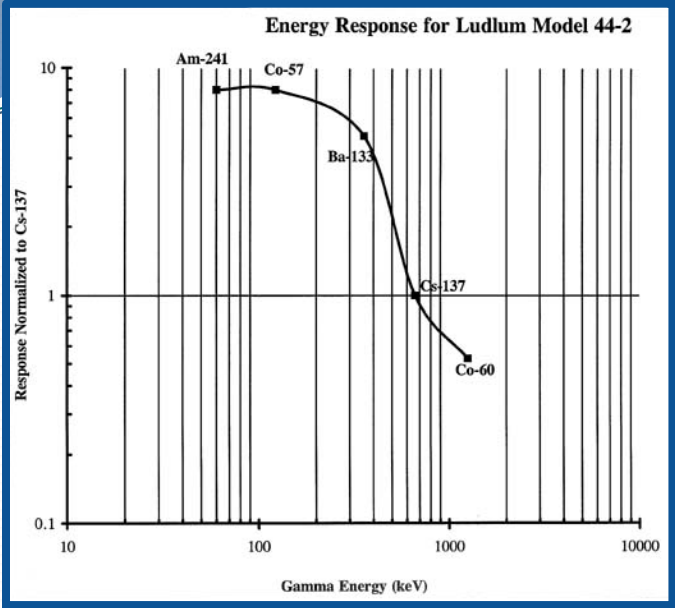
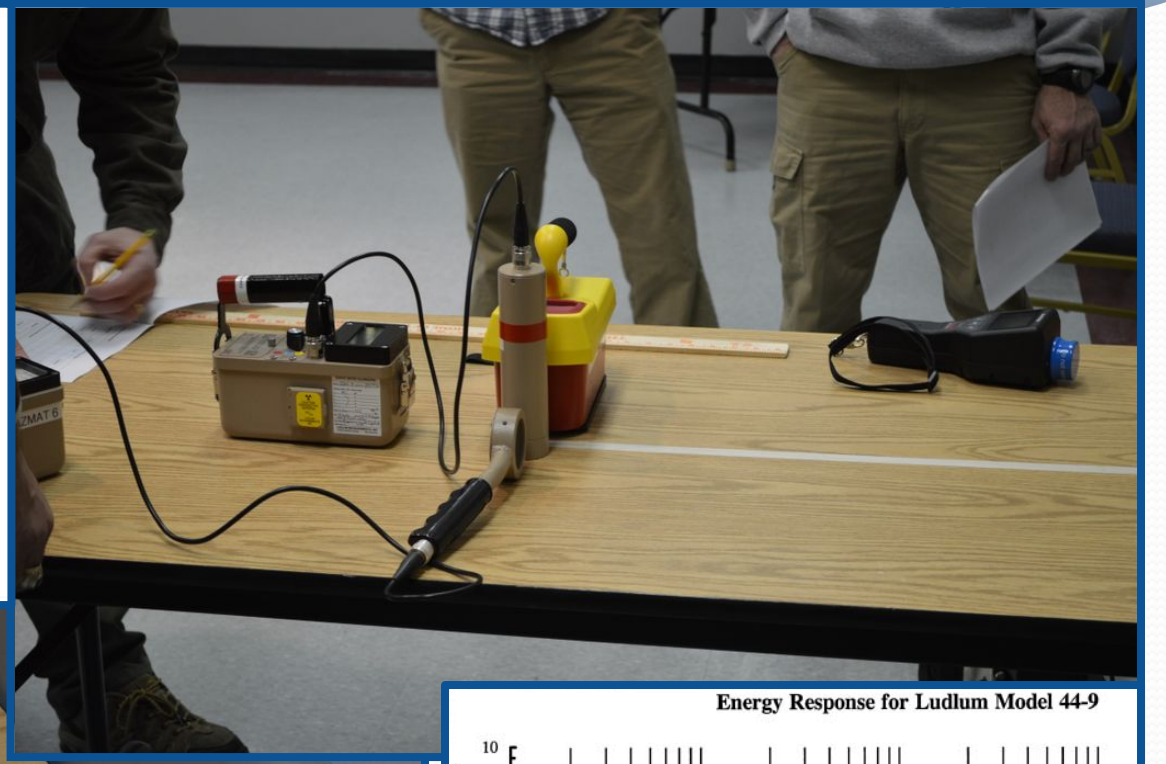
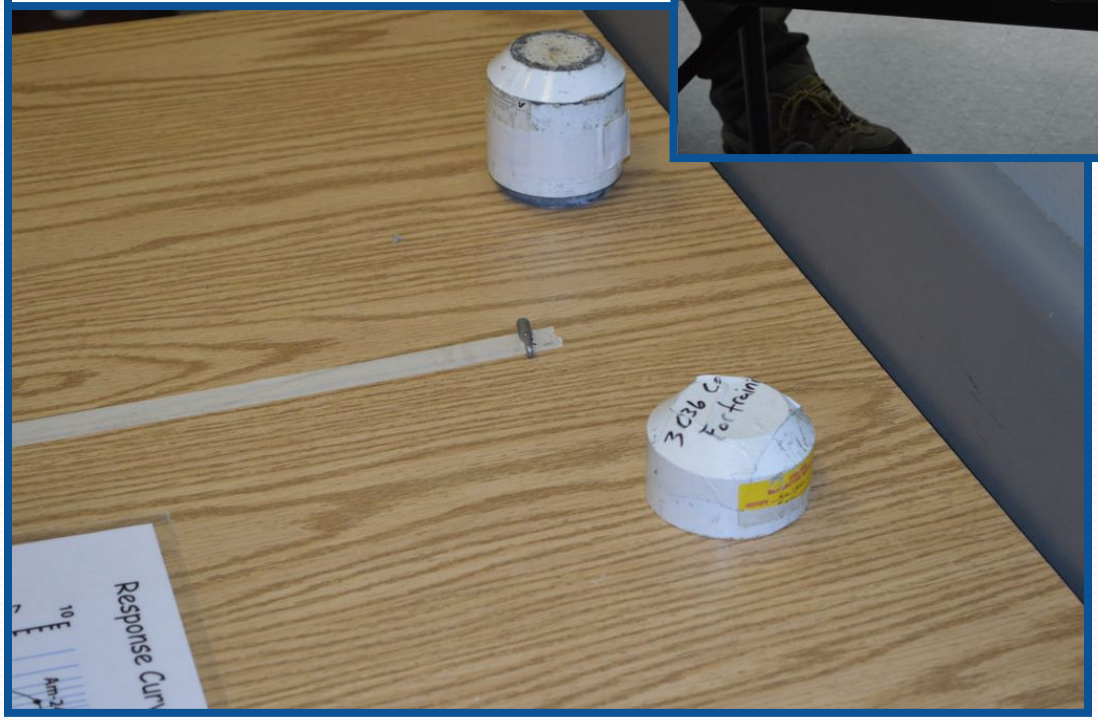
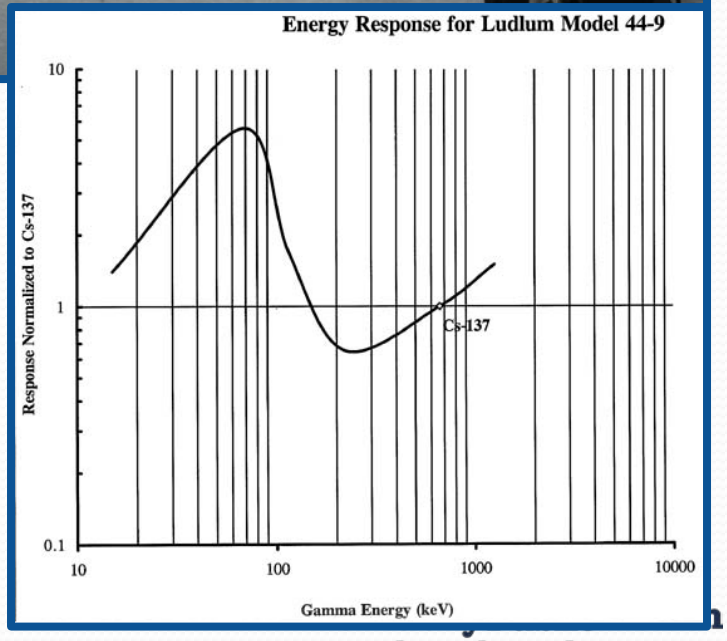

Energy Response for Ludlum Model 44-2
Am-241
Co-57
Ba-133
Cs-137
Co-60
10
1
0.1
10
100
1000
10000
Response Normalized to Cs-137
Gamma Energy (keV)






Energy Response for Ludlum Model 44-9
10
1
0.1
Cs-137
10
100
1000
10000
Response Normalized to Cs-137
Gamma Energy (keV)

Side by Side RIID Comparisons

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Inverse Square & Shielding

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What About Sealed Sources

- Sources provide by Qal-Tek Associates, LLC of Idaho Falls, ID (NRC license no. 11-27610-01)
- Qal-Tek shipped in a variety of sealed sources of different radionuclides at different activities.
- Kentucky RHB waived the $300 reciprocal recognition fee for the RS training.
- RHB provided Troxler 3411-B M/D Gauge.
- Half of the cost for the RS course is sources.

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Mfg.	Model	S/N	Isotope	Activity (mCi)
		78-4522	Ame-241/Be	40.0
		78-4445	Am-241/Be	40.0
		04191	Am-241/Be	50.0
		3036	Co-60	0.10
		F112	Ba-133	4.40
		G056	Ba-133	4.79
Amersham	67-6540	C6-543	Cs-137	33.97
Amersham	CDCSJ1	HX460	Cs-137	10.40
Amersham	CDCSJ1	HX461	Cs-137	10.40
Amersham	CDCSJ1	HX462	Cs-137	10.40
Amersham	CDCSJ1	HX463	Cs-137	10.40
IPL	CDCSJ2	KK491	Cs-137	22.78
IPL	CDCSJ2	KK492	Cs-137	22.78
Amersham		CC-2627	Cs-137	3.77
Troxler*	3411	50-4845	Cs-137	5.03
Troxler*	3411	47-11217	Am-241/Be	38.45

* Radiation Health Branch provided

Thursday Agenda

- Assignment Review
- Module 13: Acute Radiation Syndrome
- Module 14: Internal Exposure Control
- Module 15: Radiological Incidents
- Practical Exercises Rotations (45 minutes each):
  - Accident Scene
  - Easter Egg Hunt/Behind the Wall
  - State Response Capability
  - Detector Efficiency Calculations w/ Contaminated Smears

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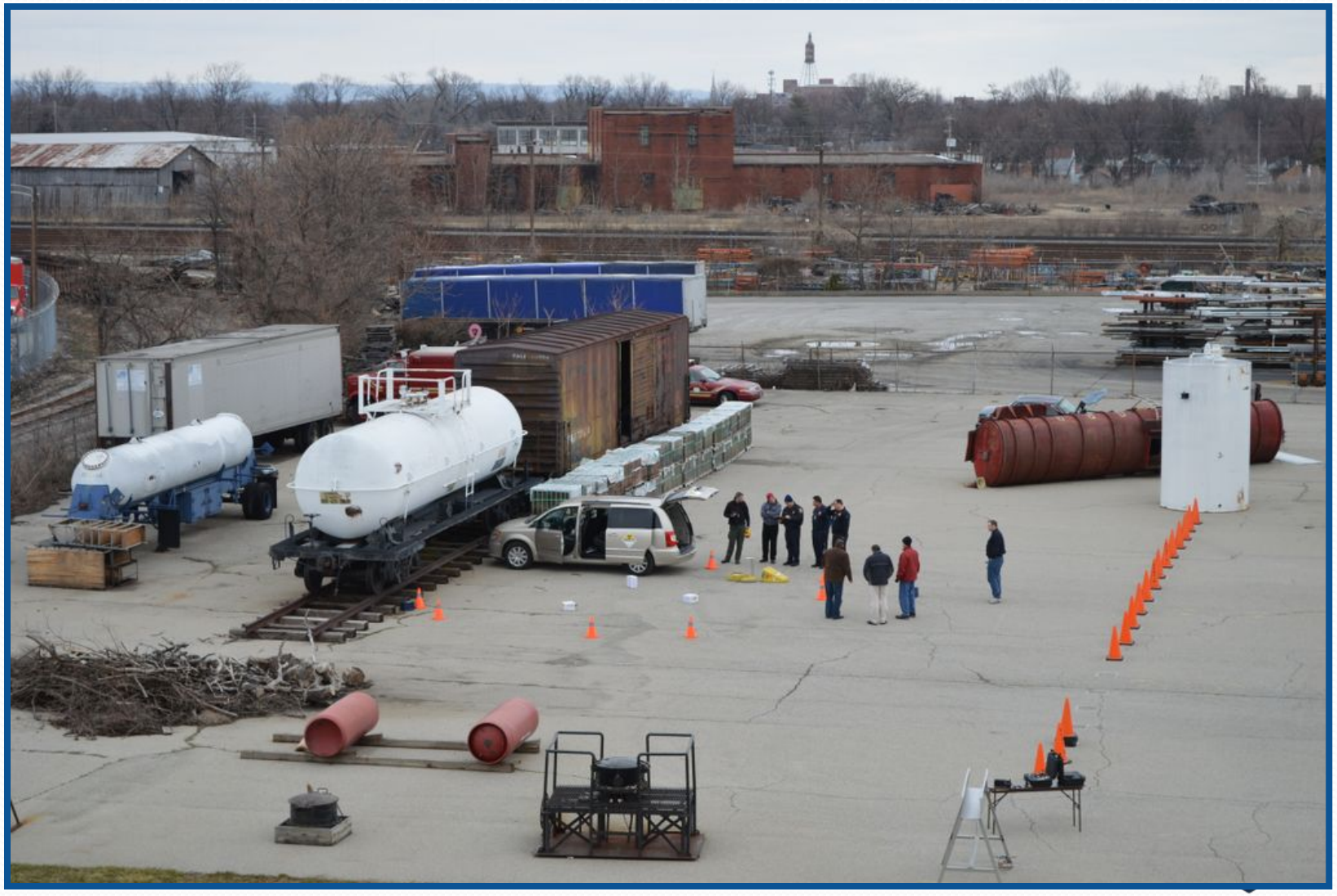
Vehicle Accident Scene



Sizing Up the Scene

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Developing Incident Action Plan, Assigning Roles, Mapping the Area

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Setting Boundaries & Checking for Contamination

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Setting Hot Zone Boundary, Taking Smears, Source Accountability

Easter Egg Hunt/Behind the Wall

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Easter Egg Hunt/Behind the Wall

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Easter Egg Hunt/Behind the Wall

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State Response Capabilities – Radiation Health Branch Mobile Lab

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Friday Agenda

- Assignment Review
- Module 16: Contamination Control
- Module 17: Personnel Decontamination
- Course Evaluation
- Graduation

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Benefits of RS Training to KY

- 25 first responders representing 17 different KY agencies now trained as Radiation Specialist.
- Trained using a uniform and standardized curriculum based on NFPA 472 Chapter 18: Competencies for the Technician with a Radioactive Material Specialty.
- Training helped build new relationships and strengthened existing relationships and improved coordination among various agencies for responding to radiological incidents.
- RS student handbooks provided excellent resource for future reference.

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"The Radiation Specialist course was without a doubt the finest rad course I have ever attended. The course will be the new standard against which we will measure all future radiological response courses."

Capt. Ricky Grant, Nuclear Science Officer, 41st WMD CST

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